Claims

What is claimed is:

1. A system for detecting a leak, comprising:

a submersible turbine pump adapted to draw fuel from an underground storage tank for delivery to a fuel dispenser, said submersible turbine pump comprising:

a power head; and

a vacuum source;

a casing surrounding said power head, said casing comprising an interior space, said vacuum source fluidly connected to said interior space such that a vacuum is generated in said interior space; and

a pressure sensor coupled to said interior space to measure a vacuum level in the interior space.

2. The system of claim 1, wherein said vacuum source comprises a siphon line generated by a venturi within said power head.

3. The system of claim 1, wherein said vacuum source comprises a turbine pump positioned within a boom.

4. The system of claim 1, wherein said pressure sensor is positioned in said interior space.

5. The system of claim 1, further comprising vacuum tubing, said pressure sensor coupled to said vacuum tubing.

6. The system of claim 1, further comprising a sensing unit controller coupled to the pressure sensor to determine the vacuum level in said interior space.

7. The system of claim 1, further comprising a tank monitor that is electrically coupled to said submersible turbine pump wherein said submersible turbine pump creates a defined initial threshold vacuum level in the interior space after receiving a test initiation signal from said tank monitor.

8. The system of claim 7, wherein said tank monitor generates a catastrophic leak detection alarm if said submersible turbine pump cannot create said defined initial threshold vacuum level in the interior space.

9. The system of claim 8, further comprising a tank monitor that is electrically coupled to said submersible turbine pump, wherein said tank monitor is electrically coupled to said pressure sensor to receive the vacuum level in the interior space.

10. The system of claim 9, wherein said tank monitor determines if the vacuum level in the interior space has decayed to a catastrophic threshold vacuum level from a defined initial threshold vacuum level.

11. The system of claim 9, wherein said tank monitor activates said submersible turbine pump to attempt to lower the vacuum level in the interior space back down to said defined initial threshold vacuum level if the vacuum level in the interior space decays to said catastrophic threshold vacuum level.

12. The system of claim 11, wherein said tank monitor determines if the vacuum level in the interior space lowers to said defined initial threshold vacuum level within a defined amount of time.

13. The system of claim 12, wherein said tank monitor generates a catastrophic leak detection alarm if said tank monitor determines that the vacuum level in the interior space does not lower to said defined initial threshold vacuum level within said defined amount of time.

14. The system of claim 9, wherein said tank monitor determines if a leak exists in the interior space by determining if the vacuum level in the interior space decays to a threshold vacuum level in a predetermined amount of time.

15. The system of claim 14, wherein said threshold vacuum level is a precision threshold vacuum level.

16. The system of claim 9, further comprising a liquid detection sensor that is coupled to the interior space, wherein said liquid detection sensor detects if liquid is present in the interior space.

17. The system of claim 16, wherein said liquid detection sensor comprises a float.

18. The system of claim 1, wherein said casing is fluid tight.

19. The system of claim 5, further comprising a check valve located in said vacuum tubing.

20. The system of claim 19, wherein said check valve lies between said power head and a sensing unit to prevent ingress of fluid from the interior space to said power head.

21. The system of claim 5, wherein said vacuum tubing is positioned within the casing.

22. A system for detecting a leak, comprising:

a submersible turbine pump comprising a power head and a vacuum source, said submersible turbine pump fluidly coupled to the fuel in a storage tank to draw the fuel out of the storage tank, wherein said vacuum source is coupled to vacuum tubing;

a casing comprising an interior space, said power head positioned in said interior space; and

a pressure sensor positioned in said interior space and adapted to sense a pressure level within said interior space; and

wherein said submersible turbine pump creates a vacuum level in said vacuum tubing to create a vacuum level in the interior space, and

wherein said pressure sensor reports the vacuum level in the interior space to a controller.

23. The system of claim 22, wherein said vacuum source is positioned within said power head.

24. A method for detecting a leak in a casing for a power head of a submersible turbine pump, said casing having an interior space, said method comprising:

creating a vacuum level in the interior space of the casing using a vacuum source associated with the submersible turbine pump;

sensing the vacuum level in the interior space using a pressure sensor; and

monitoring the vacuum level in the interior space to determine if a leak exists in the casing.

25. The method of claim 24, further comprising coupling the vacuum source to the interior space using vacuum tubing.

26. The method of claim 25, wherein said step of coupling the vacuum source to the interior space using vacuum tubing comprises coupling the vacuum tubing to the power head.

27. The method of claim 24, wherein the step of sensing the vacuum level in the interior space using a pressure sensor comprises sensing the vacuum level with a pressure sensor positioned in the interior space.

28. The method of claim 24, further comprising the step of sensing whether fluid is present in the interior space using a liquid detection sensor.

29. The method of claim 28, further comprising generating a liquid leak detection alarm if said liquid detection sensor senses liquid in the interior space.

30. The method of claim 29, further comprising disabling said submersible turbine pump if said liquid detection sensor senses liquid in the interior space.

31. The method of claim 24, further comprising closing a vacuum control valve to isolate said submersible turbine pump from the interior space before performing said step of monitoring the vacuum level in the interior space.

32. The method of claim 24, further comprising determining if said vacuum source is drawing a sufficient vacuum level in the interior space.

33. The system of claim 32, further comprising generating an alarm if said vacuum source is not drawing a sufficient vacuum level in the interior space.